

AMENDMENTS

Claims:

Please amend the claims as indicated hereafter.

a1 1. (Currently Amended) A wafer-level compressive-flow underfilling (WLCFU) process comprising the steps of:

a- applying a WLCFU material onto a surface of a bumped wafer in an amount sufficient to ensure that the thickness of the solidified WLCFU layer is less than the height of the wafer bumps;

b- solidifying the WLCFU material;

c- separating the WLCFU material coated wafer into individual chips;

d- covering the top of the bumps with a tacky film;

e- mounting the WLCFU material and tacky film coated individual chips to substrates; and

f- reflowing the solder bumps and curing the WLCFU material and tacky film simultaneously.

2. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 1, wherein said WLCFU material is a solvent-containing WLCFU material and said solidifying step includes the step of solidifying said WLCFU material by solvent removal.

3. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 1, wherein said WLCFU material is a solvent-free fluxing WLCFU material and said WLCFU solidifying step includes the step of solidifying said WLCFU material by cooling.

4. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 1, further comprising a post-curing step.

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5. (Currently Amended) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 1, wherein said WLCFU material comprises:

- a. an epoxy resin;
- b. an organic curing hardener;
- c. a latent curing catalyst;
- d. a fluxing agent; and
- e. a ~~silica~~ filler.

6. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 5, wherein said epoxy resin is selected from the group consisting of: a cycloaliphatic epoxy resin, a bisphenol A epoxy resin, a bisphenol F epoxy resin, an epoxy novolac resin, a biphenyl epoxy resin, a naphthalene epoxy resin, a dicyclopentadiene-phenol epoxy resin, a reactive epoxy diluent, and any mixture thereof.

7. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 5, wherein said organic curing hardener is selected from the group consisting of: a phenolic resins, an aromatic amine, a carboxylic acid anhydride, an imidazole, and an imidazole derivative.

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8. (Currently Amended) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 5, wherein said curing catalyst is selected from the group consisting of: a tertiary amine, a tertiary phosphine, an imidazole, an imidazole derivative, an imidazolium salt, a metal chelate, an onium ~~salts~~ salt, a quaternary phosphonium compound, 1,8-diazacyclo[5.4.0]undec-7-ene, and any mixture thereof.

9. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 5, wherein said fluxing agent comprises a compound containing a hydroxyl (-OH) group.

10. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 5, wherein said fluxing agent comprises a compound containing a carboxylic (-COOH) group.

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11. (Currently Amended) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 5, wherein said ~~silica~~ filler is selected from the group consisting of: a spherical fused silica filler, a silicon nitride filler, a silver flake filler, and a gold flake filler with diameters ranging from 0.1 μ m to 50 μ m.

12. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 5, wherein said WLCFU material further comprises a solvent.

13. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 12, wherein said solvent is an organic chemical having a boiling point between 25°C to 200°C which does not react with any other components in the WLCFU composition/formulation.

14. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 12, wherein said solvent is 4-methyl-2-pentanone.

15. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 5, wherein said WLCFU material further comprises an adhesion promoter.

16. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 15, wherein said adhesion promoter is selected from the group consisting of: a silane coupling agent, a titanate, and a zirconate.

17. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 5, wherein said WLCFU material further comprises a surfactant.

18. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 17, wherein said surfactant is a non-ionic surfactant.

19. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 1, wherein said tacky film comprises:

- a. an epoxy resin;
- b. an organic curing hardener;
- c. a latent curing catalyst; and
- d. a fluxing agent.

20. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 19, wherein said tacky film is selected from the group consisting of: a cycloaliphatic epoxy resin, a bisphenol A epoxy resin, a bisphenol F epoxy resin, an epoxy novolac resin, a biphenyl epoxy resin, a naphthalene epoxy resin, a dicyclopentadiene-phenol epoxy resin, a reactive epoxy diluent, and any mixture thereof.

21. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 19, wherein said organic curing hardener is selected from the group consisting of a phenolic resin, an aromatic amine, a carboxylic acid anhydride, an imidazole, and an imidazole derivative.

22. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 19, wherein said latent curing catalyst is selected from the group consisting of: a tertiary amine, a tertiary phosphine, an imidazole, an imidazole derivative, an imidazolium salt, a metal chelate, an onium salts, a quaternary phosphonium compounds, 1,8-diazacyclo[5.4.0]undec-7-ene, and any mixture thereof.

23. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 19, wherein said fluxing agent comprises a compound containing a hydroxyl (–OH) group.

24. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 19, wherein said fluxing agent comprises a compound containing a carboxylic (-COOH) group.

25. (Currently Amended) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 19, wherein said ~~tack~~ tacky film further comprises ~~and an~~ adhesion promoter.

26. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 25, wherein said adhesion promoter is selected from the group consisting of: a silane coupling agent, a titanates, and a zirconate.

27. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 19, wherein said tacky film further comprises a surfactant.

28. (Original) The wafer-level compressive-flow underfilling (WLCFU) process of Claim 27, wherein said surfactant is a non-ionic surfactant.

29. – 53. (Withdrawn)

In the Abstract:

Please replace the pending abstract with the newly-submitted abstract attached herewith on a separate sheet.